CLAIMS:

1. A method of generating a hybrid three dimensional reconstruction of a vascular structure affected by periodic motion, the method comprising:

placing an object affected by periodic motion to be imaged in an imaging region of an x-ray system, the object having a vascular structure;

acquiring at least two x-ray images of the vascular structure;

obtaining indicia of the phases of periodic motion and correlating the indicia with each of the at least two x-ray images;

selecting at least two x-ray images from a similar phase of periodic motion;

generating a three dimensional modeled segment of a region of interest in the vascular structure, the modeled segment reconstructed using the selected x-ray images from a similar phase of periodic motion, the region of interest only a portion of the imaged vascular structure;

generating a three dimensional volumetric reconstruction of a vascular structure larger than the modeled segment;

combining the modeled segment of interest and the volumetric reconstruction of the larger vascular structure; and

displaying in human readable form the combined reconstructed vascular model and volumetric reconstruction.

2. The method of claim 1 wherein the volumetric reconstruction includes using x-ray images from all of the phases of the periodic motion.

3. The method of claim 1 wherein the volumetric reconstruction is generated with gated images from a similar phase of periodic motion.

4. The method of claim 2 wherein the volumetric reconstruction includes a first portion of the vascular structure reconstructed using x-ray images from all of the phases of periodic motion and a second portion of the vascular structure reconstructed with gated images from a similar phase of the periodic motion.

5. The method of claim 4 wherein the reconstruction of both of the first portion and second portion of the vascular structure are combined with the modeled segment of interest.

6. The method of claim 1 wherein the obtained indicia of phases of periodic motion is representative of cardiac motion and is provided by an ECG signal.

7. The method of claim 1 including computation of an overlap map, the overlap map computed by integrating all the gray values from the reconstructed volume along the rays from a virtual source that intersect the modeled segment located between the virtual source and a virtual image plane.

8. The method of claim 1 wherein acquiring at least two x-ray images of the vascular structure is accomplished with a rotational acquisition using a C-arm x-ray system, the rotational acquisition at an angular velocity of at least 30°

per second for a scan period of at least four seconds and less than six seconds.

9. The method of claim 8 wherein the angular velocity is at least 55° during the scan period.

10. An apparatus for generating a hybrid three dimensional reconstruction of a vascular structure affected by periodic motion, the apparatus comprising:

means for supporting an object affected by periodic motion to be imaged in an imaging region of an x-ray system, the object having a vascular structure;

means for acquiring at least two x-ray images of the vascular structure;

means for obtaining indicia of the phases of periodic motion and correlating the indicia with each of the at least two x-ray images;

means for selecting at least two x-ray images from a similar phase of periodic motion;

means for generating a three dimensional modeled segment of a region of interest in the vascular structure, the modeled segment reconstructed using the selected x-ray images from a similar phase of periodic motion, the region of interest only a portion of the imaged vascular structure;

means for generating a three dimensional volumetric reconstruction of a vascular structure larger than the modeled segment;

means for combining the modeled segment of interest and the volumetric reconstruction of the larger vascular structure; and

means for displaying in human readable form the combined reconstructed vascular model and volumetric reconstruction.

11. The apparatus of claim 10 wherein the means for volumetric reconstruction uses x-ray images from all of the phases of the periodic motion.

12. The apparatus of claim 10 wherein the means for volumetric reconstruction generates the volumetric reconstruction with gated images from a similar phase of periodic motion.

13. The apparatus of claim 11 wherein the means for volumetric reconstruction includes means for generating a volumetric reconstruction of a first portion of the vascular structure reconstructed using x-ray images from all of the phases of periodic motion and means for generating a volumetric reconstruction for a second portion of the vascular structure with gated images from a similar phase of the periodic motion.

14. The apparatus of claim 13 wherein the means for combining the modeled segment of interest with the volumetric reconstruction includes means for combining both of the first portion and second portion of the vascular structure with the modeled segment of interest.

15. The apparatus of claim 10 including an ECG monitor to obtain the indicia of phases of periodic motion.

16. The apparatus of claim 1 including means for computation of an overlap map, the overlap map computed by integrating all the gray values from the reconstructed volume along the rays from a virtual source that intersect the modeled segment located between the virtual source and a virtual image plane.

17. A method of generating a hybrid three dimensional reconstruction of a vascular structure affected by periodic motion, the method comprising:

placing an object affected by periodic motion to be imaged in an imaging region of an x-ray system, the object having a vascular structure;

acquiring a rotational acquisition of x-ray images of the vascular structure;

obtaining indicia of the phases of periodic motion and correlating the indicia with each of the at least two x-ray images;

selecting at least two x-ray images from a similar phase of periodic motion;

generating a three dimensional modeled segment of a region of interest in the vascular structure, the modeled segment reconstructed using the selected x-ray images from a similar phase of periodic motion, the region of interest only a portion of the imaged vascular structure;

generating a three dimensional volumetric reconstruction of a vascular structure larger than the modeled segment;

combining the modeled segment of interest and the volumetric reconstruction of the larger vascular structure; and

displaying in human readable form the combined reconstructed vascular model and volumetric reconstruction.

18. The method of claim 17 wherein the rotational acquisition acquires images at an angular velocity of at least 30° per second for a scan period of at least four seconds and less than six seconds.

19. The method of claim 8 wherein the angular velocity is at least 55° during the scan period.

20. The method of claim 17 wherein the volumetric reconstruction includes using x-ray images from all of the phases of the periodic motion.

21. The method of claim 17 wherein the volumetric reconstruction is generated with gated images from a similar phase of periodic motion.

22. The method of claim 17 wherein the volumetric reconstruction includes a first portion of the vascular structure reconstructed using x-ray images from all of the phases of periodic motion and a second portion of the vascular structure reconstructed with gated images from a similar phase of the periodic motion.

23. The method of claim 22 wherein the reconstruction of both of the first portion and second portion of the vascular structure are combined with the modeled segment of interest.

24. The method of claim 17 wherein the obtained indicia of phases of periodic motion is representative of cardiac motion and is provided by an ECG signal.

25. The method of claim 17 including computation of an overlap map, the overlap map computed by integrating all the gray values from the reconstructed volume along the rays from a virtual source that intersect the modeled segment located between the virtual source and a virtual image plane.